State of Alaska
Department of Environmental Conservation
Division of Environmental Health

Summer Newsletter

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Featured Articles

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Deadline for National Veterinary Accreditation Program August 2

Accredited veterinarians will need to elect to participate in the newly revised National Veterinary Accreditation Program (NVAP) deadline was August 2, but the USDA will not strictly enforce the deadline if applications are submitted in a reasonable time in order to keep their accreditation. Web site: www.aphis.usda.gov/nvap

Changes Help Meet 21st Century Challenges

The U.S Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) has enhanced its accreditation program to help meet the demands of a global market and threats of emerging diseases. In most cases, the FADs have been successfully eliminated with the veterinary practitioner as the first line of defense. There has also been an increase in live animal export document requests growing from approximately 4,000 to 15,000 in the past five years. Most of these requests start with the efforts of an accredited veterinarian. APHIS depends upon accredited veterinarians to carry out many of the programs and services designed to safeguard public and animal health.

The revised program has two accreditation categories in place of the current single category, adding requirements for supplemental training with renewal of accreditation every 3 years, and providing for accreditation specializations. Veterinarians accredited as of February 1, 2010, must elect to participate in the NVAP as a Category I or Category II veterinarian; otherwise, their accreditation will expire August 2.

- Category I animals: All animals except: food and fiber species, horses, birds, farm-raised aquatic animals, all other livestock species, and zoo animals that can transmit exotic animal diseases to livestock.
- Category II animals: All animals food and fiber animal species (cow, pig, sheep, goat, all ruminant), horse (mule, ass, pony, zebra), **all bird species** and poultry, farm-raised aquatic animal species, livestock species (bison, captive cervid, llama, alpaca, antelope, other hoofed animal), zoo animals that can transmit exotic animal diseases to livestock.

Consider what Category you will need to apply, you can review the general species covered by each category below; remember that only Category II Accreditation can issue health certificates for birds. If you have specific questions contact the NVAP staff (nvap@aphis.usda.gov, or (301) 734-6827 or fax (301) 734-3641.)

How to Elect to Participate

Veterinarians need to select an accreditation category

submit a VS Form 1-36A, the National Veterinary Accreditation Program Application Form, by August 2, 2010 or their accreditation will expire. This form is available on-line at www.aphis.usda.gov/nvap (click on Instructions for Currently Accredited Veterinarians) or through the State Veterinarian or USDA Area Veterinarian- In-Charge for each state. Once you fill out Form 1-136A it will take up to 6 months to register you into the electronic database and issue a new 6 digit accreditation number that will be valid for all states. You will use this number to access online training required to maintain your accreditation.

How the Supplemental Training Works

APHIS is developing education programs for accredited veterinarians, and supplemental training is expected to be available online in December. Category I veterinarians will be required to take three units of supplemental training and Category II veterinarians will need 6 units. A unit is approximately one hour.

Online training modules have been created by the Iowa State University Center for Food Security and Public Health, and will be free to U.S. veterinarians. Paper or CD copies will be available for the cost of production and shipping for those without computer access. Training may be presented at various professional meetings. And in 2012, organizations offering accreditation relevant training through meetings may apply to have such training added to the list of APHIS-approved supplemental training. The USDA will send out supplemental training materials to anyone without internet access. All accredited veterinarians will be required to renew their accreditation every 3 years; USDA will send 3 reminders prior to the expiration date. **NOTE**: The USDA NVAP is overwhelmed with applications and the processing is taking longer due to entry errors. They have revised the website so that prior to obtaining a copy of the Form 1-136A you will have to view a webinar (15 minutes), the hope is that this will decrease the confusion regarding some of the questions. Processing will take longer so do not be surprised if you do not get a response from NVAP until March 2011.

Rabies Continues to Be a Significant Problem

Rabies continues to be a significant problem across the U.S., this emphasizes the need to keep vaccinations current.

Colorado Health Authorities state that they have already seen as many rabid skunks so far this year as it did in all of last year with over 40 skunks testing positive so far this year. The outbreak is primarily in skunks right now, although 2 foxes, one deer and a muskrat have also tested positive. "Rabies circulating in skunks in rural area east of I-25," said Richard Vogt, Tri-Country Health Department , Executive Director. "It's moving closer to to more densely-populated areas of metro Denver." While health officials say that all dogs and cats should be vaccinated, they're especially trying to make livestock owners aware of the risks.

In **New Mexico** there has been an increase in equine rabies over the past couple of years. "What's happening is 10 years ago you'd hardly see any cases of rabies. Now you're a lot more likely to," said Dr. Thompson a local practitioner. "There's been an increase in rabid animals moving south of Colorado and north from southern New Mexico. New Mexico has traditionally not been a state with much rabies, but now that there is an increase in rabid animals the risk of exposure is high.

Pennsylvania, Montgomery County handled 14 reported rabies, 10 raccoons, 2 skunks, one fox and one bat. Most of the infected animals are wildlife but public health authorities are now seeing an increase in the number of domestic pets affected.

In **Missouri**, 8 Macon County citizens are undergoing treatment after being exposed to a rabies-infected bat in their home. Judy Rushton, Administrator of the Macon County Health Department, said Cindy Malloy, RN, is leading the investigation and coordinating efforts with the family, animal control and healthcare providers. In 2009, the Missouri Department of Health and Senior Services reported 65 confirmed cases of rabies in animals. So far this year 2010, there have been 19 confirmed cases, most of them from the south-central part of Missouri.

Ohio Health Department statistics reported increased number of cases of rabies this year, most commonly found in raccoons. Oral vaccine continues to be distributed in efforts to control the spread of the disease in wildlife.

In **Florida**, Indian River County's month-long rabies alert has been expanded countrywide following confirmation of rabies in a raccoon that attacked a person and a dog without provocation in the north county, according to the Indian River County Health Department. It is the 5th unprovoked attack on humans in the last month Health Department spokeswoman Cheryl Dunn said in a statement. Her agency is calling on residents to avoid wild or stray animals, especially raccoons, skunks and bats that attack, stumble or act disoriented. Following the 5 attacks, county officials were able to capture 2 raccoons and one stray cat that all tested positive for rabies. "It is unusual for wild animals to attack humans," Dunn said, so anyone who is attacked, scratched or bitten should seek medication treatment.

The state of **Texas** cites 5 species as being the highest risks for carrying the rabies virus: coyotes, foxes, raccoons, skunks, and bats. Texas Master Naturalist

Donna Cole said skunks are the biggest rabies carrier in the state. As with all wildlife, residents are encouraged to minimize the potential for contact with skunks. Since January 1, 2010, there have been 5 positive rabies cases in animals confirmed in Denton County. According to a release from the city, rabies is a common concern in Texas, as there are hundreds of confirmed cases each year in the state. The risk of exposure increased during the spring and summer as there is more activity on the part of animals and humans alike.

Michigan Health Officials are warning residents after a fourth case of rabid skunk was found. The skunk was reportedly lying on someone's front lawn and appeared to be dying. State Public Health Officials are warning residents to be alarmed if you see these wild animals wandering about during the day or behaving in an abnormal manner and to report such activity right away.

In **Montana** rabies is endemic and generally surfaces in late spring and early summer. State officials issued rabies quarantine on Yellowstone County in June after the rabies was confirmed in a horse in Worden. An epidemiologic investigation is underway to determine if other animals or humans were exposed, the agency said. Under Montana law, counties are quarantined when rabies is confirmed in an animal such as a dog, cat, skunk, or fox. All unvaccinated dogs, cats and ferrets in quarantined counties must be vaccinated a minimum of 2 weeks prior to any being taken out of the quarantined county. The quarantine will remain in place for 60 days. Nationally, most reported rabid cases occur in wild animals like raccoons, skunks, bats and foxes he said. In Montana, bats and skunks have accounted for more than 90 percent of the cases reported since 2000.

North Dakota in 2009 over 400 animals were tested and 16 confirmed positive, and in March 43 municipal workers and volunteers at an animal shelter in Grand Forks had to receive post exposure prophylaxis after 2 stray dogs were diagnosed with rabies. The animals were brought to the shelter on March 9th one was euthanized on the 19th since its personality made it unadoptable. The other dog was adopted on the 20th but brought back in for an exam since it was vomiting and acting abnormally.

The dog's condition deteriorated and it was euthanized and tested positive on March 31st. Consequently 25 potentially exposed dogs were euthanized but did test negative for rabies and 12 others that had been vaccinated were revaccinated and put in home quarantine for 45 days. This case is a powerful reminder to encourage responsible pet ownership, timely rabies vaccination and good bio-security protocols for kennels and animal shelters.

South Carolina officials issued a rabies warning in June for Greenville County, according to a release from the Department of Health and Environmental Control. A woman in downtown Greenville was bitten by a racoon that tested positive for rabies, officials confirmed. That woman is currently receiving preventive treatment. Health officials said this is the 1st confirmed rabid animal in the county so far this year [2010]. Last year, there were 11 cases recorded in Greenville County, and 152 confirmed cases in the state.

Additional Updates:
http://www.promedmail.org/pls/apex/f?p=2400:1001:31116596091200 91::NO::F2400_P1001_BACK_PAGE,F2400_P1001_PUB_MAIL_ID:1000,83727

2010 Alaska State Fairs

Southeast Alaska Fair - Haines
July 29 – August 1
Deltana Fair - Delta Junction
July 30 - August 1
Tanana Valley State Fair – Fairbanks
August 6-14
Kenai Peninsula State Fair - Ninilchik
August 21 - 23

Alaska State Fair - Palmer
August 26- September 6

Kodiak State Fair - Kodiak
September 4 – 6

Raw Diets Banned by Delta Society

Delta Society has recently announced a policy prohibiting animals fed raw meat or raw animal products from participating in their Pet Partners program. This policy was established because of research indicating dogs fed raw meat are much more likely to be shedding harmful bacteria like Salmonella and drug resistant E. coli in their feces compared to other dogs, and the fact that these dogs come into close and frequent contact with people that are at increased risk of getting infected and having severe infections.

Not surprisingly internet chat sites are abuzz and there's more condemnation and consternation from some. Some of the more vocal minority are stating that they'll just lie and say that they're not feeding raw (I guess based on a combination of ignorance and arrogance. Feeding raw is your own decision. Blatantly flouting a policy that was put in place to reduce risks to the most susceptible people is stupid and irresponsible.)

One of the problems with peoples' reaction is the fact that they are confusing two separate issues, One debate regarding raw feeding is whether it is more healthy or more harmful to he pet. That's a controversial area and this Policy has nothing to do with that. This policy deals with a separate issue, namely the increased likelihood that raw-fed pets are shedding many harmful bacteria. That's been very well proven in scientific studies. Do raw-fed pets cause disease in people in hospitals? We don't know. However, we have enough evidence to indicate there

is the potential for increased risk to patients and that added risk can be eliminated by not feeding raw meat products.

Hopefully, people will realize that this policy has been put in place for a good reason and that it's focused on protection of people at high risk of serious illness. It's not a broad condemnation of raw feeding, just a statement that it is not considered appropriate for dogs that will have contact with high risk populations, a recommendation that's far from new. Details about this policy can be found here. Disclosure: I'm a member of Delta Society's Medical Advisory Board. However, the opinions expressed here are mine and do not necessarily reflect the views of Delta Society.
http://www.wormsandgermsblog/2010/05/articles/animals/dogs/raw-diets-banned-by-delta-society/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+WormsAndGermsBlog+%28Worms=and=Germs+Blog%29

Outbreak of EIA

The state Department of Livestock has confirmed that two horses in Gallatin County, MT have a rare and contagious disease. The horses tested positive for equine infections anemia. Horses that contract the virus must be quarantined for life or euthanized.

Livestock Department spokesman Steve Merritt says investigators believe the horses contracted the disease at a recent out-of-state event. State law requires that all horses crossing into Montana be tested for the disease. One of the horses tested positive upon returning. The Livestock Department has identified about 35 horses that may have pastured within 200 yards of the infected horses.

Equine Herpes Virus, Equine Herpes Myeloencephalopathy (EHM) An Emerging Disease in the United States

In January 2007, the Center for Emerging Issues (CEI) at USDA-APHIS-VS Centers for Epidemiology and Animal Health (CEAH) issued an Emerging Disease info sheet which suggested that the neurologic manifestation of equine herpesvirus-1 (EHV-1) met the criteria for an emerging infectious disease based on: (1) the occurrence of a more virulent strain of EHV-1 than previously seen in the United States, and (2) increased recognition of outbreaks of disease at equine events with associated high case fatality rate. The neurologic manifestation of EHV-1 is also referred to as equine herpesvirus.

Myeloencephalopathy (EHM)

Equine herpesvirus type 1 (EHV-1) is primarily a respiratory pathogen associated with a variety of clinical manifestations in horses. In addition to being a significant cause of respiratory illness and abortion in horses, EHV-1 is responsible for neurological disease, called equine herpesvirus myeloencephalopathy (EHM).

EHV-1 is enzootic throughout the world and almost all horses older than 2 years of age have been exposed. Following initial exposure, EHV-1 has the ability to develop into an inapparent, latent infection. It is this ability to reside as a silent and persistent infection in horses which provides a reservoir of virus for continual transmission. The incubation period of EHV-1 is 1–10 days; typically signs are seen within 1–3 days. Viral shedding usually occurs for 7–10 days, but can occur up to 28 days from the onset of signs. The neurologic signs include ataxia, urinary bladder atony and reduced tail tone. In severe cases, horses will be unable to stand; these cases have a very poor prognosis. Foals are rarely affected with the neurologic form of EHV-1, and no sex predilection is seen. Treatment is supportive and tailored to the specific case. Antivirals such as acyclovir, valcyclovir, famiciclovir and penciclovir have been used, but efficacy of these drugs has yet to be determined in equids.

Several recent reports (Allen et al., Goodman et al., Nugent et al.) describe a point mutation in the equine herpesvirus-1 polymerase. Terms that have been used in the scientific literature to describe the strain of the virus that contains this point mutation are neuropathogenic or mutant strain." Terms used to describe the strain of the virus that does not contain this mutation are "the non-neuropathogenic or wild-type." Both are field strains of EHV-1. The mutant, or neuropathogenic, strain of the virus was found to exist as early as 1970, based on testing of archival samples.

The frequency of paralytic outbreaks appears to be increasing, especially in the period 2000–2005. Outbreaks of EHM investigated during this period were predominately associated with the mutant neuropathogenic strain of the virus; however, the wild-type non-neuropathogenic strain has been implicated as a cause of two EHM outbreaks the mutation has been reported to be a single nucleotide polymorphism (SNP) within the EHV-1 gene encoding for the viral DNA polymerase (open reading frame 30, ORF30). This point mutation has been reportedly associated with neuropathogenicity and higher levels of viremia in horses. A PCR test was developed that allows for differentiation of the non-neuropathogenic (wild-type) from the neuropathogenic strains (mutant) of EHV-1 by detecting the SNP genetic marker (ORF30 A2254 wild-type to G2254 mutant). An SNP in the EHV-1 polymerase gene results in a single amino acid sequence.
http://www.aphis.usda.gov/vs/nahss/equine/ehv/equine_herpesvirus_brochure_2009.pdf

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TB Outbreak in Ohio

Ohio Department of Agriculture, Director Robert Boggs announced Wednesday that preliminary tests performed by the department's Animal Disease Diagnostic Laboratory revealed a positive result for bovine tuberculosis in a Paulding County dairy herd. There is no known human illness associated with this occurrence.

The herd was found positive after routine tuberculosis testing by the department. The herd was depopulated, and the department is currently conducting a trace-in and trace -out investigation to determine if other livestock may be affected.

"We are currently working with our state and federal partners on this matter to take the necessary steps to identify the origin of the affected cattle," said Boggs. "This is yet another example of how the Ohio Department of Agriculture works daily to assure the safety of Ohio consumers and livestock."

Tuberculosis is a disease caused by bacteria which affect the respiratory system. Bovine tuberculosis, also known as cattle TB, is an infectious form of tuberculosis as it infects most warm-blooded animals, including humans. It can manifest in livestock as a chronic, debilitating disease, and it may take years to develop bovine tuberculosis lesions in the lungs.

Airborne exposure from coughing and sneezing is considered to be the most frequent way in which bovine tuberculosis is spread, but it can also occur through consumption of contaminated water, feed, or unpasteurized milk.

Biosecurity should be Primary Concern Especially for Livestock Producers that Allow Foreign Visitors to Visit or Tour their Farms

Foot-and-mouth disease has spread to Miyakonojo city, Japan's largest producer of pork and beef, in the southern prefecture of Miyazaki, threatening the nation's livestock industry and feed grain demand. Foot-and-mouth is one of the most contagious livestock diseases and can have high mortality rates in young animals.

The government confirmed the outbreak in a beef cattle farm in the city, about 50 kilometers from the eastern area of Miyazaki, where the most cases were discovered. All 208 animals in the farm were culled, raising the number to about 158,600. Miyazaki is Japan's second-largest pig-farming region and third-largest producer of beef cattle. The government plans to cull an additional 113,600 animals, including uninfected ones, to prevent the disease from expanding further. Miyakonojo is also adjacent to Kagoshima prefecture, raising the risk the disease may spread to Japan's largest farming region for pigs and the second-biggest for cattle.

In Hawaii, State veterinarian James Foppoli says the outbreak Foot and Mouth disease in Japan is something travelers need to be aware of. The virus however, can be easily transmitted through clothing and shoes. Unsuspecting travelers can transport the disease quickly. "Because we get a lot of visitors from Japan, there is always a potential for movement by visitors to other locations because it is highly contagious," Foppoli said. The current outbreak in Japan is in the Miyazaki Prefecture, in the Southern island of Kyushu.

Those traveling to Japan and Korea are being asked not to visit farms or ranches until the outbreak is over. Travelers are also being asked to avoid contact with livestock or wildlife for five days, prior to, and after returning home.

Repetitive Cattle Deworming May Cause Drug Resistant Worms

Dewormers have provided effective parasite control, which has resulted in returns to farmers between $20 to $200/hd. The cost of these products is reasonable when compared to potential productions gains provided. Sheep and goat farmers have long battled with drug resistant worms, however until recently there has not been evidence of this is occurring in beef cattle. In fact, some of the first evidence of worm resistance in cattle was found in Wisconsin in 2002, when a backgrounder, who acquired calves from the Southeast, experience lower than expected weight gain during the fall.

According to Dr. Shulaw, Extension Veternarian at Ohio State University, "Unlike sheep and goats, cattle tend to develop a much stronger immune response to gastronintestinal parasites after a season of grazing exposure." However, research from USDA Agriculture Research Service (ARS) and North Carolina State University (NCSU) have reported evidence of increasing resistant worm populations and decreasing efficacy of deworming drugs like avermectin pour-ons.

Dr. Gasbarre, recently retired ARS parasitologist, conducted research at the Wisconsin backgrounding operation, which used intensive grazing management and strategically timed deworming for more than 17 years. The research confirmed the decreased performance in calves was due to internal parasites still present after deworming. Research at NCSU, compared efficacy of various in anthelmintics (generic label ivermectin pour-on, brand-name ivermectin pour-on, injectable ivermectin, or drench of fenbendazole) in two different research herds. In one herd, where previously worm resistance had been identified, the only dewormer to have greater than 90% reduction in fecal egg counts, was fenbendazole. In contrast, all the anthelmintic treatments in the other herd reduced fecal counts by more than 90%. This indicates worm resistance to anthelmintics may be specific to herds and locations, therefore internal parasite control may need to be developed specifically for a farm.

Internal parasite management is no longer as simple as deworming cattle, but should include some of the following strategies:

- 1. Fecal Egg Count Reduction Test (FECRT) protocol, used by USDA National Animal Health Monitoring System (NAHMS), is a valuable tool to determine when animals need to be dewormed. In addition, this can be used to detect worm resistance in a group of cattle. The test can cost between $10-15 per head, but the entire herd does not need to be tested. A farmer should test at least 20 of the most susceptible animals in the herd.
- 2. Calves are more susceptible, shed the most eggs, and require less product to deworm than cows in the herd. farmers could reduce cost and overuse of product by only deworming calves in the herd at the appropriate times.
- 3. Farmers should avoid overusing dewormers and use these products in moderation. This can occur by deworming when the drugs are most effective instead of when convenient to administer. Furthermore, the dewormers should be given using the correct dose. This requires knowing the actual individual weight or average body weight of the animal when administering the drug.
- 4. If resistance is detected though testing, changing drug class is recommended. Another alternative could be rotating chemicals in the deworming program.
- 5. Good pasture management is also critical to reduce resistance. Rotate cattle through pastures to reduce re-infections, and it is recommended to let the pastures rest for 3 to 4 weeks before reintroducing cattle.

Regulation Can't Keep Pace with Livestock

UN: Livestock production is growing faster than capacity to safely manage it. Livestock production is growing faster than the capacity of nations to safely and responsibly manage it, according to the United Nations' Food and Agriculture Organization. In the latest edition of its flagship report, "The State of Food and Agriculture," the FAO says that while the rapid growth of the livestock sector is helping to improve human diets, it is also posing a threat to poor farmers, the environment and human health.

People in developing countries today are consuming nearly twice as much milk, more than three times as much meat and five times as many eggs as they did five decades ago, according to the FAO report. Meanwhile, consumption of cereals and root crops has been fairly flat. The higher intake of livestock products, the report says, is the result of rising population, urbanization and increasing affluence in many parts of the world.

Weak Institutions, Inadequate Regulations

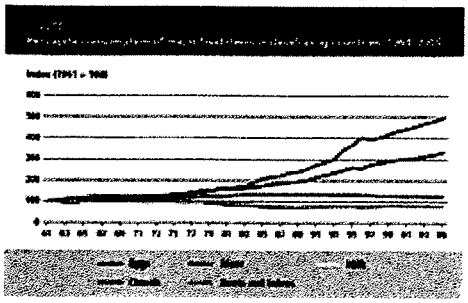
Livestock help improve human nutrition, provide income and serve as a safety net for many poor farmers. But the industry's expansion has come at a cost, according to FAO Director-General Jacques Diouf.

"In many parts of the world," he says, "the rapid growth and transformation has occurred in a setting of weak institutions and inadequate regulations. This has given rise to systemic risks affecting livelihoods, the environment as well as human and animal health."

The FAO report points to the growth of large-scale,

industrial operations that have pushed some small producers and pastoralists to the margins. Bigger livestock herds are putting greater pressure on land resources and disrupting some ecosystems and the animals generate significant amounts of water and air pollution, including methane, a climate-changing greenhouse gas. Furthermore, livestock diseases, as well as food-borne and human diseases, are also mounting.

Problems Beyond the Developing World



FAO

Consumption of livestock products has increased rapidly in developing countries over the past decades, particularly from the 1980s onwards. The problems have not been limited to developing countries. Take, for example, the outbreaks of mad cow disease in Europe and swine flu in the United States. But Nicholas Minot at the International Food Policy Research Institute notes that these countries have relatively well-established regulatory systems to oversee livestock health, meat processing and food safety.

"The same problems exist in developing countries, but the institutional development of regulatory agencies lag[s] behind. And I think particularly given these high-profile disease outbreaks there is a tremendous interest in strengthening the diseases control and monitoring programs."

The FAO report says developing countries will need to strengthen disease control regulations, as well as improve environmental controls and minimize the dislocation of small farmers as the livestock industry continues to grow and concentrate into large-scale enterprises.

Finding the Right Balance

But FAO Assistant Director-General Hafez Ghanem cautions that government regulators need to weigh the full spectrum of economic, environmental, social and health issues associated with livestock production.

"For example," he says, "if you're only looking at the economic aspects of livestock production, that might lead to producing in ways that are harmful to the environment or harmful to health. It's obvious. On the other hand, if you only look at the environmental impact, you can hurt people's livelihoods."

Ghanem says that as the demand for livestock products continues to grow, governments need to consider these competing objectives and find the right balance.

Emerging Tick-borne Disease: A Domestic Ecological Mystery

Stories of environmental damage and their consequences always seem to take place far away and in another country, usually a tropical one with lush rainforests and poison dart frogs. In fact, similar stories starring familiar animals are unfolding all the time in our own backyards- including gripping tales of diseases jumping from animal hosts to people when ecosystems are disrupted.

This time we're not talking hemorrhagic fever and the rainforest. We're talking tick-borne diseases and the Missouri Ozarks. And the crucial environmental disruption is not the construction of roads in the rainforest, it is the explosion of white-tailed deer populations.

An interdisciplinary team at Washington University in St. Louis has been keeping a wary eye on emerging tick-borne diseases in Missouri for the past 20 years. Team members include ecologists Brian F. Allan and Jonathan M. Chase, molecular biologists Robert E. Thach and Lisa S. Goessling, and physician Gregory A. Storch.

The team recently developed a sophisticated DNA assay, described in the March 2010 issue of Emerging Infectious Diseases, that allows them to identify which animal hosts are transmitting pathogens to ticks. "This new technology is going to be the key to understanding the transmission of diseases from wildlife to humans by ticks," Allan says.

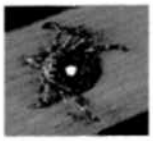
Full text:
http://www.eurekalert.org/pub_releases/2010-02/wuis-etd022510.php

Three New Tick-Borne Diseases

Missouri has three common species of ticks. The black-legged tick (Ixodes scapularis) that carries Lyme disease is found here, but is far less common than in other regions of the country. Missouri also has American dog ticks (Dermacentor variabilis), which carry Rocky Mountain Spotted Fever, but again this is a less frequently encountered species.

The most common tick is Amblyomma americanum, called the lone star tick because the adult female has a white splotch on her back. It is a woodland species originally found in the southeastern United States whose range now extends northward as far as Maine. Until recently, this tick, which is an aggressive and indiscriminate biter, was considered a nuisance species, not one that played a role in human disease.

Then in 1986 a physician noticed bacterial clusters called morulae in a blood smear from a critically ill man that looked like those formed by bacteria in the genus *Ehrlichia* (named for the German microbiologist Paul Ehrlich). At the time *Ehrlichia* were thought to cause disease only in animals.



The bacterium was later identified as a new species, *Ehrlichia chaffeensis*, and the disease was named human ehrlichiosis. In 1993 *E. chaffeensis* DNA was found in lone star ticks collected from several states. Ehrlichiosis typically begins with vague symptoms that mimic those of other bacterial illnesses. In a few patients, however, it progresses rapidly to affect the liver, and may cause death unless treated with antibiotics.

In 1999, a second *Ehrlichia* species was identified as an agent of human disease. The DNA of the newly identified bacterium was also found in lone star ticks. Gregory A. Storch, M.D., the Ruth L. Siteman Professor of Pediatrics at the Washington University School of Medicine in St. Louis, led the team that identified the second *Ehrlichia* species. Blood samples from patients in the St. Louis area who might have a tick-borne disease are still sent to Storch's lab for analysis. But the erhlichioses weren't the only emerging diseases the tick was carrying. In the 1980s, reports had started to trickle in from Missouri, North Carolina and Maryland of an illness accompanied by a bulls-eye rash. Called STARI, for southern tick-associated rash illness, it resembled Lyme disease but didn't seem to be as severe. The lone star tick was also incriminated in these cases. STARI is thought to be caused by a bacterium named Borrelia lonestari, after its tick vector.

The Question

"The question," says Thach, Ph.D., professor of biology in Arts & Sciences and of biochemistry and molecular biophysics in the School of Medicine, "is where do infectious diseases come from?" "Most seem to come from nature - they exist in other animals - and then make the leap from animals to people, Thach says." Assuming this model applies to the lone star tick diseases, what is their animal reservoir and why are they jumping? Lone star ticks need blood meals to power their metamorphoses (they go through three stages: larva, nymph and adult) and egg laying. They sometimes bite coyotes, foxes and other animals, but their favorite hosts are wild turkey and white-tailed deer. Especially white-tailed deer, which seem to be playing a major role in maintaining large lone star tick populations and setting the stage for tick diseases to jump to people.

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Suspicion Grows

Fieldwork conducted by Allan, Ph.D., a post-doctoral research fellow at Washington University's Tyson Research Center in the oak-history forests that grace the rolling hills of the Missouri Ozarks, was reinforcing the team's suspicions about deer. In forests managed by the Missouri Department of Conservation and by the Nature Conservancy, Allan was looking at the effect on tick numbers of management practices such as selective logging and prescribed burns. Allan's results show that management practices sometimes have counterintuitive effects on tick numbers. For example, he reported in the *Journal of Medical Entomology* in September 2009 that prescribed burns increase tick numbers and human risk of exposure to lone star tick diseases. To make sense of this counterintuitive result all you need to do is follow the deer. A prescribed burn leads to a flush of new plant growth. Deer, which are selective browsers, are attracted by the tender greenery. They flood into the burn sites, and drop blood-sated ticks as they browse.

Getting Blood from a Tick

Although deer were looking shady, the case against them was still largely circumstantial. Could the scientists get definitive evidence? Allan found a way. He read about an assay that had been developed in Jeremy Gray's lab at University College Dublin to identify animal reservoirs of Lyme disease. ("There are twice as many cases of Lyme disease in Western Europe as there are in the United States," says Thach, "and there is a lot of Lyme research being done there.") Allan asked Thach whether his lab would be willing to develop a similar assay for the lone star tick diseases. "With my colleague Lisa Goessling," Thach says, "we developed the technique here and used it to analyze the ticks Brian brought in from the woods." "The technology for identifying mosquito blood meals has existed for some time," Allan says, "because they take many blood meals over a short period of time, so the blood is usually still fresh when you capture them. And they keep coming back for another meal, so it's very easy to capture them. It's much harder to get blood from a tick, which usually takes only one blood meal per life stage," Allan continues. "By the time we capture the tick eight months to a year may have elapsed. The tick has had a long time to digest that blood, so there may be only a tiny amount of DNA left — if there's any." The team does two assays on the tick DNA: one to identify pathogenic bacteria and the other to identify the animal that provided the blood and with it the bacteria.

Analyzing DNA in the Blood

The first step in the assay is to pulverize the ticks to release the DNA, which is then amplified using a procedure called the polymerase chain reaction, or PCR. This provides enough DNA for identification. Following amplification is a step called reverse line blot hybridization.

Probes, which are short sequences of DNA unique to a bacterium or to a host animal, are deposited in lines on a membrane. The membrane is then rotated, and the products of the PCR step -- tagged with a chemiluminescent (light-generating) dye -- are laid down in lines perpendicular to the probe lines.

Wherever two lines cross, DNA from the tick sample mixes with probes for either bacterial or animal DNA. If the two match, the molecules will bond, or hybridize. When the membrane is later washed, tick-sample DNA that has not hybridized washes off. DNA that has hybridized sticks and shows up as a chemiluminescent spot on the membrane. Reading the spots, tells the scientists which bacteria the tick was carrying and which animal provided its last blood meal. Assay results showed that most of the nymphal lone star ticks infected with *E. chaffeensis* fed upon a white-tailed deer in the larval life stage. "So deer are definitely a primary reservoir for this bacterium," says Thach. "But we also found some kind of squirrel — which we have more recently identified as the common gray squirrel — and what appears to be some kind of rabbit."

In general, the results suggest deer are probably "weakly competent reservoirs" for the tick diseases, meaning that ticks that bit deer stood only a small chance of picking up one of the pathogens. On the other hand, deer have huge "reservoir potential," because there are so many of them. The bottom line: a sprinkling of deer is ok; crowds of deer are a problem.

Too Many Deer

Are the bacteria that cause the new tick-borne diseases truly new or have they existed for a long time in wildlife reservoirs like the white-tailed deer without causing human disease? "We don't know the answer," says Allan, " but my guess is these tick-borne diseases are probably being unleashed by human-mediated environmental change." By human-mediated environmental change he means deer protection, the human behaviors that have led to an explosion in white-tailed deer populations.

"Some state agencies plant food plots for deer, we've created deer forage in the form of crop fields and suburban plantings, and we've taken away almost all of their predators — except cars," Allan says. To be sure, white-tailed deer were once nearly eliminated from the state. In 1925 there were thought to be only 395, according to the Missouri Department of Conservation. The hunting season was closed that year and again from 1938 through 1944, and deer were re-located to help reestablish them in the state. In 2009, Lonnie Hanson of the Missouri Department of Conservation estimated the herd at 1.4 million. Nationwide the pattern is similar. Nobody is sure how many deer there are, but estimates range from 8 to 30 million, levels everyone agrees are excessive. "If you had to point to one factor that led to the emergence of tick-borne diseases in the eastern United States, it would have to be these unnaturally large populations of deer," Allan says.

Swine Vaccinations

When pig health consultant, David Burch, first looked at the financial modeling of Post-weaning Multisystemic Wasting Syndrome (PMWS) there was relatively little data. Treatment and control trials had only been carried out on swine farms that had been severely affected. In those days a typical 6% mortality from the causal PCV2 virus produced around a 6 kg reduction in average liveweight gain in finisher pigs. Now that more trial data has accumulated - covering mild herd infections as well as severe disease outbreaks - a different picture is emerging. In a new review he considers the data from ten PCV2 vaccine trials, covering 50,000 pigs in North America and the European Union.

This metadata study reveals that unvaccinated growing pigs in infected herds with no actual deaths from disease, still lose an average of 2.5 kg in liveweight in comparison to vaccinated piglets. As the mortality rate increases by 1%, the average liveweight in surviving pigs decreases by approximately 0.5 kg, so that at a 6% mortality rate from PMWS [PCV2 infection] a pork producer not only loses 6% of finisher pigs but also suffers depressed production of 5.5 kg [average per pig] in the survivors. These production losses can be explained by the severity of organ damage to the pigs due to PCV2 viraemia, plus the fact that fighting this virus infection uses up energy that should have gone into growth.

The Octagon Services consultancy has created a free Cost/Benefit Calculator for pig farmers considering vaccinating against PMWS - a syndrome now more commonly referred to as PCVAD [Porcine CircoVirus-Associated Disease]. The calculator begins with trial data based on costings in Euros, but users can input their own data in any currency. David Burch's latest review, and the online interactive calculator, can be accessed at www.pighealth.com/circovirus.htm

Early Weaning Impacts Gut Enzyme in Piglets

University of Guelph researchers have uncovered one of the reasons why piglets often struggle with illness and sometimes die when they are weaned from their mothers. According to the new study, a gut enzyme involved in digesting phosphate and fighting off harmful bacteria is significantly compromised during the early-weaning process. "We found that the early weaning of piglets reduced the level and performance of alkaline phosphatase in the gut, which can lead to decreased growth development and illness," said Dale Lackeyram, a PhD student who worked on the study with animal and poultry

science professor Ming Fan. "These study results have benefits for the pork industry. Early weaning is critical for farmers when it comes to maximizing production, but it's also the time when a majority of piglets die or their quality of health suffers."

This finding can also have implications for humans, when it comes to understanding what happens during the weaning process, because the digestive system of pigs and humans are similar, Lackeyram added.

These findings extend the host range of the H5N1 influenza virus, possess implications for influenza virus epidemiology and highlight the need for the systematic surveillance of H5N1 in animals in the vicinity of backyard poultry units, especially in endemic areas.

FDA New Website Designed for Veterinarians

http://www.fda.gov/AnimalVeterinary/default.htm
This part of the home page is particularly useful:
Development & Approval Process
New Animal Drug Applications, Electronic Submissions, User Fees, Genetic Engineering, Minor Use/ Minor Species, Aquaculture, Food Additive Petitions

Guidance, Compliance & Enforcement
BSE (Mad Cow Disease), Policies & Procedures Manual, Laws

News & Events
CVM Updates, FDA Veterinarian Newsletter, Meeting Announcements

Products
Approved Animal Drug Products, Animal Food/Feed, Imports & Exports

Resources for You
Animal Health Literacy, Consumer Information, FDA and the Veterinarian

Safety & Health
Adverse Drug Events, Product Safety, Animal Feed Safety System (AFSS), Antimicrobial Resistance, Animal Cloning, Recalls

Science & Research
Research Areas, Publications

Department of Environmental Conservation
Environmental Health Laboratory
Office of the State Veterinarian
5251 Dr. MLK Jr. Avenue
Anchorage, AK 99507